

SOME ASPECTS OF BIRD/MAMMAL ASSOCIATIONS: CONTRIBUTIONS FROM THE INDIAN PLAINS AND THE ZIMBABWE PLATEAU¹

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Some species of birds associate with mammals to feed on insects living either near or on them. This paper attempts to quantify the size of these aggregations with mammals and compare them with unassociated birds on the plains of India and the plateau of Zimbabwe. In India four species of bird were observed associating: two of them occurred in larger groups in such associations and preferred cattle to water buffalo. In Zimbabwe in a drought situation, with a much lower density of mammals, a much higher proportion of observed birds were in such associations. Egrets are known to obtain more food in such associations but this is not proved for the other species involved.

INTRODUCTION

All organisms need a competitive edge of some sort for survival. One such advantage is feeding associations between birds and mammals which are a common sight in the tropics. Some birds gain significant amounts of food from such associations, e.g. in Africa oxpeckers *Buphagus* spp. are obligate feeders on ticks (Ixodidae) and other ectoparasites and have lost range in southern Africa with the decimation of large mammal populations (Brooke 1984).

Another example of conservation significance concerns the endangered Kirtland's Warbler *Dendroica kirtlandii* in the United States, whose range has recently been invaded by a nest parasite the cowbird *Molothrus ater*. This bird was previously an associate of the American Bison *Bison bison* and has now expanded its range with the arrival of cattle populations in the range of the warbler and now reduces its breeding success by over a half (McFarland 1981, Robison and Bolen 1989).

There have been few quantitative studies of such associations and even fewer of a total community. To the best of my knowledge there are none published for India. Hence while travelling around northern India by train mainly through peasant owned farmland between April and August 1982 covering a distance of 3000 km, an attempt was made to record all associating birds and domestic

mammals and quantify their associations. No attempt was made to record all Common Mynas *Acridotheres tristis* because they are liable to be overlooked when perched in trees. The superabundance of the House Crow *Corvus splendens* led to my recording all sightings for only a portion of the total distance. Other species recorded associating with domestic mammals were Cattle Egret *Bubulcus ibis* and the Black Drongo *Dicrurus macrocercus*.

A similar study was performed over a number of years in Zimbabwe by vehicle through European farms and peasant occupied communal areas in the late eighties covering a distance of some 5000 km recording all birds associating and their hosts. The birds involved here were mainly Cattle Egrets again and Forktailed Drongo *Dicrurus adsimilis*, which is considered a different species from the Indian bird. There are published studies of Cattle Egret associations in Southern Africa (Blaker 1969, Siegfried 1978), but not of any other species.

METHODS

A herd was defined as any group of animals in a finite area separated by a larger area from other such groups. A bird was regarded as being in association with a mammal if it was within two metres of that mammal regardless of its perch. Where mixed groups of mammals were observed these were divided into species and the corresponding bird species associating with them were recorded. The number of mynas observed on Dal Lake, Kashmir

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in June 1982 were used for the comparisons of the number of birds in association and not associating. Statistical analyses were performed on the results using students t-tests to determine significant differences. The percentage of all birds (excluding mynas for reasons given above) observed associating, out of the total number observed is also presented. An attempt to see if the number of birds in association with a group increased with increasing group size failed because virtually all groups observed were small (less than five animals). Animal and bird masses are taken from Lander (1949) and Ali and Ripley (1968-1974) respectively. These animal masses are probably larger than the peasant owned stock observed here. These have been used as an estimate of the relative size of the animals and birds concerned.

A similar study was done in Zimbabwe travelling between Bulawayo and West Nicholson. Statistics were not performed for this data but otherwise methods were similar except that for drongos the distance required for association was increased even on occasion to the other side of the road as this bird chases flying insects which are flushed by hosts.

RESULTS

Eight types of domestic mammals were observed in bird/mammal associations in India, but of these donkeys, sheep, pigs, camels, and horses contributed only a very small proportion of such associations and are not further discussed. A total of about 650 groups each of cattle and water buffalo and nearly 300 groups of goats, giving a total of between 5000 and 6000 head each, were observed.

Table 1 presents the frequency of bird/mammal associations observed on the plains of India. For each of the three mammals the percentage of groups observed with each avian species is presented. Further, the percentage of each bird (except the myna) observed in such associations is also presented. Table 2 presents the mean number (\pm the standard deviation) of birds in association with each mammal and those not in such associations

TABLE 1

FREQUENCY OF BIRD/MAMMAL ASSOCIATIONS ON THE PLAINS OF INDIA (EXPRESSED AS THE PERCENTAGE OF GROUPS WITH ASSOCIATING BIRDS AND THE PERCENTAGE OF BIRDS OBSERVED ASSOCIATING OUT OF THE TOTAL NUMBER OF BIRDS OBSERVED)

Bird Species	House Crow	Common Myna	Cattle Egret	Black Drongo
mass	300 gm	110 gm	360 gm	45 gm
cattle (mass 360 kg)	1%	7%	6%	5%
water buffalo (mass 630 kg)	3%	13%	10%	7%
goat (mass 70 kg)	1%	1%	1%	5%
% of birds in association	1%	—	16%	20%

are presented. Data are too meagre for such calculations with goats. All these birds are believed to be residents performing at most local movements in the area. At this time of the year, all four species would be breeding (Ali and Ripley 1968-74): though some species may be represented by nonbreeders for instance the Cattle Egret.

The number of Common Mynas in mammal associations is significantly larger than those not in such associations ($t=2.812$, $p<0.05$). This assumes that flock sizes in Kashmir (altitude 2000 m) are the same as those on the plains. The number of egrets associating and not associating is not significantly different; but the numbers associating with cattle is significantly larger than those associating with water buffalo ($t=1.813$, $p<0.05$). Black Drongos, which are the smallest of the four avian species considered here, is the only one not to show a lower association with the goat groups. The number of drongos in associations is significantly larger than the number of those not in such associations ($t=2.116$, $p<0.05$). All species show a preference for the heaviest animal (water buffalo) in terms of the number of groups

TABLE 2

NUMBERS (MEANS \pm STANDARD DEVIATIONS) OF BIRDS WITH AND AWAY FROM HOSTS ON THE PLAINS OF INDIA

	House Crow	Common Myna	Cattle Egret	Black Drongo
Water buffalo	1.1 \pm 0.7	1.6 \pm 0.6	1.5 \pm 0.1	1.4 \pm 0.8
cattle	1.3 \pm 0.4	1.6 \pm 0.9	3.5 \pm 2.4	1.1 \pm 0.4
total bird/mammal	1.4 \pm 0.9	1.6 \pm 0.9	—	1.3 \pm 0.6
away from mammals	1.2 \pm 0.6	1.3 \pm 0.5	4.6 \pm 2.1	1.1 \pm 0.4

associated with. This makes sense if we assume that the largest animal flushes the most insects or supplies the best perch.

Thirty one records of two bird species and one record of three species associating with the same group of mammals (mostly water buffalo) were observed.

TABLE 3

FREQUENCY OF BIRD/MAMMAL ASSOCIATION ON THE ZIMBABWE PLATEAU (AS TABLE 1)

	Cattle Egret	Forktailed Drongo
Cattle	6%	11%
goats	5%	0.5%
% of birds	70%	40%

TABLE 4

NUMBERS OF BIRDS WITH AND AWAY FROM THEIR HOSTS (AS TABLE 2)

	Cattle Egret	Forktailed Drongo
cattle	3.5	1.2
goat	7.2	1.0
total bird/mammal	4.8	1.2
away from mammals	1.4	1.1

Tables 3 and 4 present similar data from the Zimbabwe plateau. A total of 579 herds of cattle and 262 herds of goats were observed giving a lower density for each species and a much lower overall biomass of domestic animals due to the absence of water buffalo. In contrast to India the egret is a passage migrant through the area: passing quickly through around April and not associating much and again in Sept./Nov. when it does associate. The drongo is a resident but like Indian birds undergoes local movements when not breeding: in Zimbabwe this is believed to be into more open areas (Irwin 1981). Like the Cattle Egret (Blaker 1969 and this study), they associated more in the dry season. The egret appears to aggregate in larger flocks with goats than with cattle, though two large flocks of 16 and 30 were seen with goats in April, a time of year when they occur in larger groups and do not usually associate. No such flocks were seen with cattle at this time of year. The drongo appears to show no variation in numbers with either animal or away from animals.

No records of more than one species associating with the same group were obtained despite the increased rate of association. Does this imply that in India some groups are more attractive to associating birds than others? While the drongo is well known as an aggressive species, it is difficult to believe that any territorial exclusion occurs between the two species and no cases of aggression were observed. In any case the drongo takes flying insects whereas the egret takes mainly grasshoppers and they are presumed not to be in competition for food.

DISCUSSION

Dean and Macdonald (1981) have divided bird/mammal associations into those which compete with their host for food and those which use the mammal to obtain their food. The myna and the crow are omnivorous taking some vegetable food and are thus potentially in competition with their hosts. The other two species are purely insectivorous (Ali and Ripley 1968-74). Another possible aspect of these

associations is disease transmission but this has not actually been demonstrated (Dean and Macdonald 1981). It is possible that the birds also gain some protection or concealment from predators from these associations. It is not always clear what the mammal gains from these associations though the myna has been recorded as eating ticks in Southern Africa, where it has been introduced (Dean and Macdonald 1981) and presumably do so in India. Another suggestion is that the egret (at least) takes herbivorous insects, which compete with cattle for food (Dinsmore 1973).

All these bird species feed on insects attracted to or flushed by the mammals for instance, coprophagous beetles. Some use the mammal as a perch though egrets only do so in long grass (Siegfried 1978) and I have never observed it. Animals in woodland are less likely to have attending birds. Drongos will also use a perch on a tree or a fence near the herds for the same purpose. The other species tend to forage on the ground behind the animals though I have seen mynas preening while perched on a mammal.

I doubt if the House Crow gains significant amounts of food from these associations except perhaps by raiding grain bins. Its very ubiquity appears to lead it to perch on or around the mammals especially in the absence of other suitable perches. On the Calcutta Maiden, in the absence of the other suitable mammals, they were observed attempting to perch on goats. The goats however actively attempted to dislodge these birds by running and swinging their bodies until the crows dropped off. Unless the crows were trying to glean ectoparasites, which was not observed, I can only interpret this behaviour as a type of play (McFarland 1981).

Indian Elephants *Elephas maximus* were observed behaving similarly to dislodge mynas, which appeared to have become too numerous and too noisy, in Mudumalai Reserve in Tamil Nadu.

The crows are highly adaptable: in Calcutta zoo they were observed associating with African mammals, e.g. Eland *Tauretragus oryx*. Cattle Egret occur in larger groups with cattle but they occur with a larger percentage of groups of the bulkier water

buffalo but the actual numbers of egrets associating with each species are similar. This is in contrast to the situation in Australia where water buffaloes are preferred (Siegfried 1978). This might also be a function of the more aquatic habits of the water buffalo, which appears likely to be the original host in Asia. In Africa the original host is believed to be the buffalo *Syncerus caffer*, which also prefers flooded grasslands (Siegfried 1978). The same flock sizes with and away from hosts is in contrast to the South Africa situation where flocks are larger and away from their hosts (in this case only cattle) (Blaker 1969). Cattle Egrets acquire more prey with less effort when associating with cattle (Dinsmore 1973). Smith (1971) has demonstrated this for two species of anis (*Crotophaga* spp.)

The Zimbabwe situation in the Cattle Egret is different again with same size of flocks with cattle as in India, an increased use of goats and much higher percentage of birds in associations. This is believed to be a reflection of very poor feeding conditions due to the succession of drought years which occurred in Zimbabwe during the study. The same flock size in both areas may be a reflection of territorial behaviour.

Benson (1964) reported that drongos were seen associating with five groups of cattle on a journey of 150 km in a nearby area of Zimbabwe. The former author never observed such associations by drongos in 30 years in Zambia and Malawi, which have a higher rainfall than the southern areas of Zimbabwe where these birds were observed. There is another published record from Banket (Parnell 1962). Most of these records come from low rainfall areas (less than 600 mm per year). This makes it difficult to understand why drongos in Zimbabwe did not increase in numbers when with their hosts or why they made a much lower use of goats in an area with much lower domestic mammal densities. Yet they doubled their use of cattle groups and the proportion of birds with hosts as compared with India. This suggests that the drongos were regulated by other factors like territorial behaviour. I have also observed a drongo perched on a small shrub near a chicken and apparently associating with it. This bird has been

reported as associating with ostriches *Struthio camelus* (Dean and Macdonald 1981).

I also observed Glossy Starling *Lamprotornis* sp. and a Pied Crow *Corvus albus* once each associating with cattle. It is striking that these four birds represent the same families as the birds seen in such associations as in India. Further in Britain a starling *Sturnus vulgaris* and a crow *Corvus corone* are also commonly observed in fields with domestic animals most frequently sheep. Cattle egrets and drongos do not occur in Britain. Are these birds/families somehow preadapted to such associations more than other families? Or are they birds who have adapted well to farming habitats? The crows at least are believed to have increased with human numbers. Certainly the Cattle Egret has vastly increased its

range due to its association with cattle in the wake of their range being increased to include the Americas and Australia (Siegfried 1978).

Bird/mammal associations have been very little studied in the tropics though the tremendous increase in the range of Cattle Egrets has generated interest in this species. It is hoped that this contribution will stimulate others to study such associations more closely.

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REFERENCES

- ALI, S. & S.D. RIPLEY (1968-1974): Handbook of the birds of India and Pakistan. Oxford University Press, Delhi.
- BENSON, C.W. (1969): Birds associating with ungulates. *Auk* 81: 436.
- BLAKER, D. (1969): Behaviour of the Cattle Egret *Ardeola ibis*. *Ostrich* 40: 75-129.
- BROOKE, R.K. (1984): South African Red data book-birds. *S. Afr. Nat. Scient. Prog. Report* No. 10.
- DEAN, W.R.J. & I.A.W. MACDONALD (1981): A review of African birds feeding in association with mammals. *Ostrich* 52: 135-155.
- DINSMORE, J.J. (1973): Foraging success of Cattle Egrets *Bubulcus ibis*. *Am. Midl. Nat.* 89: 242-246.
- IRWIN, M.P.S. (1981): Birds of Zimbabwe. Quest Publishers, Harare.
- McFARLAND, D. (Editor) (1981): The Oxford companion to animal behaviour. Oxford University Press, Oxford.
- LANDER, P.F. (1949): The feeding of farm animals in India. Macmillan, London.
- PARNELL, G.W. (1962): Birds following cattle. *Honeyguide* 39: 1-2.
- ROBINSON, W.C. & E.G. BOLEN (1989): Wildlife ecology and management. COLLIER McMILLAN Publishers, London.
- SIEGFRIED, W.R. (1978): Habitat and modern range expansion of the Cattle Egret. *National Audubon Report* No. 7.
- SMITH, S.M. (1971): The relationships of grazing cattle to foraging rates in anis. *Auk* 88: 876-880.